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THE HUMAN BODY: A JUSTIFICATION

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THE HUMAN BODY: A JUSTIFICATION

By C. O. HAWTHORNE, M.D.

THE Human Body is an object both of general and of individual interest. Assuredly it merits the terms applied to it by the Psalmist: it is "fearfully and wonderfully made." Why is it made? What is its essential nature? Here is an attempt to answer these questions.

In its first beginning it is simple in the extreme. Its earliest appearance is that of a microscopically minute unit of living matter (protoplasm). This unit produces other units more or less like itself, and these in turn repeat the process. Thus by the multiplication of units is built up the fully-developed bodily structure. It may well be asked, What purpose is served by this extensive and complex development? Or, in other words, Can the existence of the Human Body be justified?

There is a quite confident answer to this question. For, although in detail the body is a highly elaborate and complicated structure, the principle upon which it is planned is relatively simple. Indeed, an adequate structural definition is provided by the statement that the Human Body is a vast collection or group of minute living units (cells or corpuscles, as they are called) together with

certain materials (of these, Bone is an example) formed by the activities of these units. Tested by the microscope, whatever part of the body is examined, all display the presence of living cells.

It is obvious that necessary provision must be made to meet the essential needs of these living units. These needs, in principle, are covered by the following simple proposition: Each living cell, whether isolated or member of a group, requires food and water (nutrition), each requires oxygen (respiration), and each as a result of its activities produces waste matters which are harmful to its life and must be removed.

In the Human Body these needs of the constituent cells are met by the Blood, from which, through the delicate walls of microscopically minute blood-vessels (capillaries), exudes a fluid which as it were bathes the cells, forms a medium in which each unit lives, and from which each satisfies its needs. In short, the Human Body is a colony of cells living on the banks of the Blood-stream, and from this stream each unit nourishes itself and breathes for itself; and into the blood-stream each unit discharges its waste material. It therefore follows that if the Blood is to maintain its value and service, arrangements must be made to add to it regular supplies of food, of fluid and of oxygen, and to remove from it accumulating waste materials. Special bodily organs (cell-groups) are appointed to meet these

demands. Thus food and water enter the blood through the stomach, oxygen through the lungs, while harmful waste material is drained from the blood through the kidneys, lungs and other organs (excretion). Here the lungs play a double rôle: the avenue through which the needed oxygen enters the blood and the exit by which the waste and prejudicial carbondioxide escapes from it.

Particular additions to the blood are made also by certain groups of body-cells known as Ductless Glands. These contributions are of various kinds and of great importance. They exercise a large influence in maintaining the well-being and balance of the physiological machinery; and deficiency or excess of one or more of them means a corresponding failure in bodily health.

A further and manifest necessity is that the blood, thus enriched and purified, shall be carried from the points at which these additions and subtractions are respectively effected, into the immediate neighbourhood of each of the cells or units of the human colony. That is, there must be a flow or circulation of the blood, and this must be rightly directed and steadily maintained. The driving force of this circulation is supplied by the central pump or Heart, and the distribution of the blood throughout the body is effected by the Blood-vessels (arteries, capillaries, veins).

One more apparatus is yet needed by this elaborate colony. This is a communication apparatus or Nervous System so that messages may be conveyed between different parts of the body and the orderly and harmonious working of the whole machinery be secured. The central or head office of this Nervous System is in the Brain and Spinal Cord while the conducting wires are provided by the nerve fibres.

Here then is the structural and functional lay-out of the plan of the Human Body. Complicated indeed in detail, but in principle and plan a colony of living units so organised and arranged that the essential wants of each of the units are duly met and secured.

At the same time, as is indeed conspicuous, while every Human Body is constructed in accord with one and the same plan and pattern, each, by adjustment of detail, has an individuality and identity of its own. For example, each presents finger-prints which distinguish him from his fellows, and Brown is not Jones and Smith is not Robinson. Each is indeed an organised colony of living cells but by particular combinations and arrangements each possesses features which secure for it an individual quality and distinction. This statement applies both to structural details and also, at least in some measure, to functional activities, and in these personal differences, heredity and the substances added to the Blood

by the Ductless Glands play a very important part.

It is now to be asked, What are the advantages of this impressive and complex organisation as compared with the position of a living being which consists, like the amoeba, of a single unit satisfies all its wants from the fluid ıich is its natural habitat ? Each, d the amoeba, has the capacity to f and to breathe for itself ; and each ange its position and to reproduce its ², in principle, the man would not se respects to differ essentially from unicelluar organism ; difference in dent but not so far difference in kind. es the question, What is the true n of the passage in living beings city to complexity ? Or, as part of ɔn, Upon the possession of what apacity does the special value of the ⁄ rest ?

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er to these questions is to be found lishment in the human colony of the l division of labour and the results which attend this principle. This means, in practice, that while each unit or cell must continue to undertake its own nutrition and its own respiration, it is free to devote a share of its energies to some special work having value to the welfare of the colony as a whole. Each of

the individual units becomes as it were an expert in some appointed task necessary for the general welfare, and it can do this in reliance on the arrangement which brings to it the essential food and fluid and oxygen in the circulating blood. That is, the body is not merely a group of living cells but is rather an organised colony in which, while provision is made for the essential needs of the individual cells, each group of cells has a duty to pay to the welfare and success of the whole community. Under these conditions living units, dwelling in security in respect to their elementary needs, develop capacities entirely beyond the reach of the isolated unit that has to spend all its energies in the effort to keep itself alive. In particular, certain of the constituent cells of the human body become responsive to such physical agents as light, sound, taste, smell and the like.

And still further, in the higher reaches of the nervous system have come into existence units which recognise and respond to non-material agencies (mental, emotional, moral) and have developed activities associated with thought and judgment and with the ability to appreciate the appeal of duty and beauty and truth. In short, by the multiplication and organisation of vital units in the human body, certain of these units enjoy such a degree of detachment from mundane cares that they are able to recognise and to respond to forces and influences which to the isolated independent cell are entirely

ineffective and unknown. Thus changing the Poet's line we may read " The capacities of the corpuscles are widened with the process of the suns."

Some examples may be quoted in illustration of these general statements. One is an instance of a self-sacrificing contribution made by individual cells to the general welfare. It is seen in the cells (epidermis) which cover the external surface of the body. These are appointed to provide a measure of protection against surface injury, and they effect this purpose by converting themselves into a scaly or horn-like layer, the superficial parts of which are continually being rubbed- or brushed-off while the protecting layer is just as constantly renewed by new cells advancing to the surface from the deeper layers. The epidermal cells, that is, sacrifice themselves in the general interest—" the individual withers and the world is more and more." Or, to quote from another source,

> "*Unbroken was the ring*;
> "*The stubborn spearmen still made good*
> "*Their dark impenetrable wood,*
> "*Each stepping where his comrade stood,*
> "*The instant that he fell.*"

These lines will be recognised as descriptive, by Sir Walter Scott, of an incident in the battle of Flodden Field. But they may equally be claimed as the Epic of the Epidermis.

A further example of communal service may be noted in the activities of the stomach and the process of digestion. In normal circumstances when food enters the stomach the cells which form the wall of the stomach proceed to digest it, that is to fit it for entrance into the blood-stream and for the nutrition of other members of the colony. Yet, as is well-known, if, instead of food, certain unsuitable substances are taken into the stomach these are not digested but expelled in the act of vomiting, while certain medicines (purgatives) are passed along the intestine and removed from the body. In this contrast between digestion and rejection it may be difficult to say that the responsible cells exhibit "intelligence." Yet they certainly show some capacity for choice, which, though it may be labelled "instinctive," is none the less an instance of individual cell-action taken in the interest of the whole community.

At a higher level may be noted the effective reaction of certain cell-units of the nervous system to non-material forces. Take for example the simple notion expressed in the sentence "Better is he that ruleth his spirit than he that taketh a city." On the single-celled amoeba this falls unheeded and without effect, but from the multi-cellular human body it receives recognition and awakes a response. And it does so because as a result of organisation and of the physiological division of labour, certain of the

constituent cells have developed new capacities, new qualities and new responses. It is through these added possibilities that the human body lives and acts under the influence of moral, emotional and intellectual motives. Through them man, in Carlyle's phrase, "strikes the sky with his sublime head."

Admittedly it is difficult to understand, difficult indeed to imagine, how physical and chemical changes in living cells can be related, either as cause or as effect, to mental and emotional experiences. None the less it remains true that when certain cell-groups in the brain are deprived by disease of an adequate blood-supply, or are physically injured or destroyed, these experiences become limited or even altogether suppressed.

The same principle reigns throughout the whole of the bodily organisation. Each group of cells has an individual contribution to make to the efficiency of the general community. The appointed function may be direct and constructive, as the building and repair of bone; or self-sacrificial, as with the cells of the epidermis; or the unfailing repetition of a particular action, as the beat of the heart and the respiratory movements of the chest-wall; or uninviting, as the excretion of waste matter; or, in contrast to these comparatively lowly offices, the appointed duty may be the cultivation of those special responses which distinguish the higher reaches of

the nervous system. And it is on the balanced activity or "natural piety" of its several parts—neither deficiency nor excess—that the harmony and well-being of the human colony depend.

The picture is broadly sketched in the 12th chapter of the First Epistle to the Corinthians where the Apostle writes, " the body is one and hath many members, and all are members of one body ; " and again, " those members of the body which seem to be feeble are necessary, and our uncomely parts have more abundant comeliness." That is, in more prosaic terms, in all parts of the human colony is seen the dignity of service to a common end, namely the satisfaction of the essential needs of the constituent cells and the development of active responses to certain forces to which it is advantageous or necessary that the human colony should adapt itself.

Here then is the justification of the existence of the Human Body. Commencing as a single unit or cell it develops into a vast and organised colony of cells in which may be recognised (1) provision to meet the nutritive and respiratory needs of the constituent cells ; (2) arrangements to secure ordered and harmonious co-operation between the several organs or cell-groups ; and (3), as the most distinctive feature, the presence in the brain of groups of nerve cells which respond not only to material but also to non-material agencies and thus relate the Human Body to the

influence of mind and memory and will and consciousness and emotion.

> *"What a piece of work is a man! . . . .*
> *the paragon of animals!"*

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